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AUTHOR Chappell, Willard R.; Baur, James F.
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ABSTRACT

The objective of the Colorado Mexican-American Student Program was to motivate capable Mexican American students to consider the possibility of attending college. Students for the program were selected according to the following criteria: (1) Mexican American ancestry, (2) completion of at least grade 10, (3) promising academic potential, and (4) some degree of underachievement. The program, a 4-week summer session following completion of grade 10, was held at the University of Colorado (Boulder) and consisted of discussion groups, lectures, and laboratories. The staff consisted of a director, 3 instructors, and various unpaid volunteers. A continuation of the program through 2 years following the summer session had 4 functions: to maintain contact with the students and their parents; to help the students improve their grades by providing tutoring; to assist students in applying for college admission and financial aid; and to inform selected colleges about the program and the students who have participated. A follow-up study of the 21 students who entered the program in 1969 showed that 12 began college in the fall of 1971 and 1 entered a professional school. It should be noted that, although this particular program was physics-oriented, there is no reason why it should not work in the framework of any other discipline or with any other minority group. A related document is RC005905. (PS)

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A PHYSICS-ORIENTED COLLEGE MOTIVATION PROGRAM

FOR MINORITY STUDENTS

Willard R. Chappell

and

James F. Baur

Department of Physics and Astrophysics
University of Colorado, Boulder, Colorado 80302

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Introduction

The Colorado Mexican-American Student Program differs considerably from physics programs previously developed for high school students and reported by other colleges and universities. Whereas most such programs attempt to identify and encourage students already proficient or interested in science, our program attempts to influence a larger number of less than academically outstanding Mexican-American students regardless of any career choice they may have made. The objective of our program is to motivate capable Mexican-American students to consider seriously the possibility of attending college.

Although the program described here is for Mexican-American students in the urban Denver area, a similar program could be equally successful for other minority groups in other geographic, cultural and economic settings. Briefly, the program consists of a four-week summer session following completion of the tenth grade. This program is held on the University of Colorado campus in Boulder and consists of discussion groups, lectures (mainly physics related) and laboratories. The summer session is followed by a less intense program of tutoring, college counseling and reunions. The details of the summer session and follow-up programs will be described in later sections of this report.

The feeling of all those who have been associated with the program is that it has succeeded in making positive and significant

changes in the lives of most of the participating students. The program is physics-oriented only because it was developed and staffed by physicists, but there is no reason why it should not work in the framework of any discipline or combination of disciplines. Moreover, there is no reason to believe that it could not succeed with any other group of educationally or culturally disadvantaged students. Our purpose here is to try to interest other high schools and colleges in becoming involved in this type of program.

Problems of Mexican-Americans

Colorado has a significant population of Mexican-Americans (in fact, it is the main minority group) as do all the southwestern states. The problems of this group are legion, and are becoming more generally known.[1] The amelioration of the social problems--juvenile deliquency, public dependency, school drop-outs--seems to depend on the youth of today obtaining a better education than their parents did.

In 1968 this general situation and possible remedies were discussed among the faculty of the Department of Physics and Astrophysics. Quick action ensued after Robert H. Williams learned of a motivational program for Mexican-American students sponsored by the physics department at Stanford University.[2] He and one of the authors (WRC) modified the Stanford plan to fit local conditions,

developed the general principles for the Colorado Mexican-American Student Program, obtained faculty and student support, obtained official sponsorship of the program by the Department of Physics and Astrophysics, and made preliminary contacts with the local Mexican-American community. Soon after the general principles of the program were announced, a group of about six volunteers coalesced as a planning committee to work out the details and to oversee the continued operation of the program. The Latin American Research and Service Agency, a group that has a broad range of contacts in the community, served us well in the ensuing contacts with Mexican-American community leaders and the Hispano Youth Motivation Program of the Denver Public Schools, which led to formal approval by the Denver Public Schools.

Having received the enthusiastic approval of the Mexican-American community, the Denver Public Schools, and the faculty of the Department of Physics and Astrophysics, we turned our attention to the problem of obtaining funding. Because of the relatively low budget of about $9,000, the program had good potential for drawing private foundation support. The funds for the first year program were obtained from the Max C. Fleischmann Foundation. The second year program was supported in part by the Denver Public Schools, which paid the salary of the Summer Director (a Denver teacher), and in part by the Max C. Fleischmann Foundation. The third year's program is being supported jointly by the Denver Public

Schools and the University of Colorado through its Educational Opportunity Program.

Selection of Students

After discussing at some length the problem of student selection, we arrived at the following list of criteria:

1. Mexican-American ancestry
2. Completion of at least the tenth grade
3. Promising academic potential, with average or better grades
4. Some degree of underachievement.

The first two criteria are very objective and the last two highly subjective. The advantage in choosing students who have just completed tenth grade is that those students who respond positively to the program have two more years in high school in which to prepare themselves for advanced education. A program such as ours, aimed at students who would not ordinarily be planning for college, probably would not be as effective if begun later.

The students selected for the first year of the program represented a broad spectrum so that we could pinpoint the types of students who might benefit the most from the program. We found in general that the greatest positive changes were experienced by those students who had at least some motivation before they entered the program and who had grade point averages between a C- and a B.

We had no students with A averages in the program and most of those with D or lower averages apparently had such severe problems that they could not be helped by this program as we have developed it, although one student who had a D average when taken into the program is presently enrolled in college.

The selection is based on teacher, counselor, and student recommendations plus a personal interview by the director of the program. Approximately 24 students are selected each year and approximately half are females. Since we are not trying to recruit physics majors or even scientists, a science bent is not a prerequisite. The students are not charged for the program. We provide bus transportation, lunches, and a stipend of $120 upon successful completion. Also upon successful completion of the summer program the students receive one semester of high school physical science credit.

We have adopted the "one school" concept. Rather than dissipate the influence of the program by choosing a few students from several high schools, we elected to have a larger group of students all from one high school. This way interschool rivalries do not interfere with the program, all students in the program can meet casually during school hours and develop friendships started during the program, a larger group tends to reinforce during the school year the positive attitudes developed during the summer, and followup activities are much easier to coordinate. Also, a larger group makes possible a "ripple effect" which influences a much lar-

ger number of students outside the program itself. Denver North High School, a Title I target school, was selected for our program, partly because of its 33% Mexican-American enrollment, a very cooperative principal, and its location on the intercity bus route to Boulder.

Staff

The paid staff consists of a director and three instructors. The director selects the students, assists in planning the entire program, supervises the daily activities during the summer and the periodic activities during the winter, and is the person directly in charge of the students. This person has been selected from the faculty of North High. The instructors work in the various activities of the summer program. They have generally been selected from the graduate student body at the University.

Volunteers provide a substantial part of the technical content of the program. The faculty sponsor (WRC) donates a moderate amount of time throughout the year. The planning staff of about six spends a moderate amount of time for about two months and a small amount of time the rest of the year. About thirty graduate students and faculty members contribute from one to ten hours each in presenting one of the lectures or in helping during the laboratory periods; a few of the volunteers spend substantially more time on the program. Some lecturers from other departments in the

University and from science institutions in the Boulder community are invited to participate.

Summer Program

The four-week summer portion of the program begins a week or two into the school vacation period with a Sunday orientation for students and parents on the Boulder campus of the University. The purpose of this event is to get acquainted with the students in an informal setting and to gain the confidence of the parents. Simple refreshments are served, the program is explained, and tours of the campus, the cyclotron, and several physics laboratories are conducted by our staff and several volunteers. It is very important to reach the parents, for they can be an important factor in whether the son or daughter develops and maintains an interest in attending college. The orientation helps the parents understand and identify with the program, and tends to allay any fears the parents may have concerning the college atmosphere and the professors to whom they are sending their children. We have found also that since the parents are given some orientation to the program and since the students commute each day (rather than being boarded on campus), the parents receive daily reports from their children, thus maintaining some parent-program influence through the four-week period.

The typical daily schedule is as follows:

8:00	A.M.	Board bus in Denver
8:45		Arrive on campus
9:00		Discussion Groups
10:15		Break
10:30		Science Lecture
11:45		Lunch and free time
1:00	P.M.	Laboratory Groups/Friday discussion
3:30		Free time
4:00		Board bus on campus
4:45		Arrive in Denver

Four Discussion Groups are organized with the paid staff as leaders, supplemented by one or two especially interested volunteers. The objective here is to encourage thoughtful discussion among the students, to provide a basis for friendship among students and between the leader and the students, and to provide the vehicle to explore the campus and the university setting. Initial topics of discussion are announced when the groups are being formed--history of the Southwest, astronomy, particle physics and rock music, and communication among people, were some of the topics--but students are guided by the discussion leaders into other topics, according to the interests of the particular group. Campus vists are made, for example, to some selected summer classes, to the Office of Foreign Study, and the museum. It is through the activities of the Discussion Groups and the rapport which develops

with the staff that we try to provide the foundation for accomplishing the aims of the program.

The Science Lecture series is designed to show that a large number of enthusiastic people enjoy working in intellectually stimulating fields. The lectures are one hour or slightly longer in duration. Lecturers are asked to keep the mathematics simple, include demonstrations whenever possible, stay after the lecture to talk to interested students, and join the group for lunch. Most of the lectures are given by the physics and astronomy faculty and graduate students, but we have deliberately included some lectures from other disciplines. Once each week we travel off campus for our lecture to provide some variety and to become aware of other than purely academic scholars. We usually visit the National Bureau of Standards for low temperature physics, the National Center for Atmospheric Research for weather research, and the Poorman Mine in the hills west of Boulder to observe a gravity waves experiment.

Laboratory Groups meet Monday through Thursday in facilities provided and supervised by sub-groups of the physics faculty. The objective is to have the individual student interact on a one-to-one basis with university personnel while he completes one or more science projects. We want every student to take home at the end of the summer program at least one physical object which he has made. This object or working device becomes a focus of conversa-

tion about the program between the student and his friends and family. The presence of the physical object in the student's home also tends to remind the student and his parents of the program and helps to maintain some commitment to the aims of the program. Some Lab Groups built 60X telescopes, some built photocell circuits, did radioactivity experiments, built and flew model rockets, some learned the fundamentals of photographic composition, developing, printing, enlarging, and various photographic tricks and camera techniques, and some made holograms. We have found photography to be a very successful laboratory project because the students see results very quickly. All students are encouraged to use their initiative to individualize their projects within the general framework we arrange. We schedule the last two periods in the Science Lecture series as time for the Lab Groups to report their activities and demonstrate their devices to all the students in the program.

Friday afternoons are spent in a series of presentations and/or discussions on topics related to college admissions and financial aid, types of colleges and their relative costs, career patterns, and Mexican-American history and culture. The objective is to expose the students to the wide choice they have for continued education and to insure that they understand the fundamental steps in choosing a college, gaining admission and applying for aid. This somewhat formal presentation phase of the program is necessary

in order that our informal counseling over the following two years (or longer) will be effective. Representatives of Denver area state colleges, private colleges, and community colleges have been extremely cooperative in presenting this general college related information to the students.

One of our volunteers has developed what we call our Career Visits project. Sandwiched into the typical schedule are blocks of time for some scheduled and some optional prearranged informal visits to skilled and professional people in the local area. We encourage our students to meet representatives of as many career fields as they like and to ask questions about job satisfactions, academic preparation, and future trends for the field. Later in the program and during the following academic year, if necessary, we try to arrange followup visits or visits to additional fields.

Recreational activities are also available, usually on an optional basis. Recent activities included a softball game, swimming at the reservoir, hiking in Rocky Mountain National Park, and a picnic lunch in the foothills in Roosevelt National Forest.

The banquet on the last Friday evening of the summer program presents another opportunity to reinforce the meaning of the program to the students and their parents. Following the meal we stage as impressive a display and program as possible. Some of the student work from the Lab Groups and sometimes from the Discussion Groups is on display. Completion certificates and stipends are pre-

sented to the students. Short speeches are given by prominent members of the Mexican-American community, the faculty sponsor, the director, and some of the students. Movies, slides, or photographs made by the students during the program are shown. The aim is to give the students as much pride in themselves and the parents as much pride in their children as possible.

Winter Program

The Winter Program conducted during the remaining academic years from the time of participation in the Summer Program until the students graduate from high school, has four functions:

1) To maintain contact with the students and their parents
2) To help the students improve their grades by providing tutoring
3) To assist students in applying for college admission and financial aid
4) To inform selected colleges about our Program and the students who have participated.

The program director, a teacher or counselor at North High School, supervises the Winter Program and provides much of the continuing contact with the students. The director advises the students personally, insures that they recieve career counseling services provided within the school, monitors the students' academic records, and arranges occasional meetings between some or all of the

students and staff members of the program. Two or three social events for students and staff are usually scheduled. In the past these have included a group admission to a rock concert in Denver, a group admission to a University of Colorado football game in Boulder, and a student sponsored banquet featuring Mexican food. Volunteers from the Summer Program are encouraged to telephone occasionally those students with whom they developed a close relationship.

About ten volunteer undergraduate and graduate students work in teams to tutor students desiring academic help. A large fraction of the students request tutoring and find it helpful.

The director and selected staff members meet with the seniors to insure that they complete all steps in the process of applying for further education. The program pays for one set of college entrance examinations. We provide blank forms for admission to Colorado state schools and obtain forms for other schools whenever a student so desires. We also send a letter to all colleges in Colorado containing an explanation of the program and the names and addresses of the seniors. In addition, the faculty sponsor monitors the progress of students' applications for admission and financial aid through frequent contacts with college officials to insure speedy and accurate processing.

Budget

The most recent budget is included here:

Director, summer and winter	$ 1400
Instructors	1350
Student stipends	2880
Lunches	480
Transportation	720
Laboratory supplies	600
Orientation, banquet	305
Books, supplies, reports	400
Winter program	700
	$ 8835

Results

To a large extent the evaluation of a program like this must be subjective. During the second year we did try to make some measurements to obtain quantitative data. With the volunteer help of a member of the psychology department, a test was devised to try to measure changes in attitudes and goals of the students. This measurement was not completed, however, partly because our small budget was inadequate but mostly because of the great inconvenience for the high school teachers involved in the testing.

We believe that the small size is one of the great strengths of the program. It allows the volunteers and staff to become

acquainted with most of the students. In particular, both the director and faculty sponsor are able to develop a personal relationship with each student. This is particularly helpful during the follow-up program. Moreover, most departments would find their facilities stretched to handle many more students and we feel that an important part of the program is that regular faculty members and students are involved rather than a staff hired from outside.

It is because the program is small, allowing personal knowledge of all the students by the director, faculty sponsor, and a few other volunteers, that we feel confident when we say the program is a success. We have seen students develop more positive attitudes toward themselves and school. We have heard parents, proud that their son or daughter was in our program, tell us that the student's attitudes toward them and toward their school work have improved. We have seen shy, withdrawn students come out of their shells and develop into happy young men and women.

This year we have seen "graduates" of our program enter college, some of whom we are certain could not have gone on to higher education under ordinary circumstances. Of the 21 students who entered the program in 1969, 17 graduated from high school this year. Only two students, both of whom had severe family problems, dropped out of high school. The other two will graduate next year. Twelve of those who graduated began college in Fall of 1971. One of the remaining five is in a professional school (dance) and three others

are married. We believe that one or two of these five will eventually begin college.

It could be argued that many of those with whom we worked might have made it anyway. But such a contention would stand on weak ground in view of the academic and attendance records of the students when they entered the program and the financial plight of the families. Even the case of the one student with a strong academic record when entering the program illustrates the need for the reinforcement and follow-up supplied by the program. This student, who went from a B+ to an A- average after the summer session, encountered such severe problems in the complicated application procedure for one college that had we not intervened to straighten out the confusion she would not have been in college this fall.

Thus, our claim that the program is a success and is desperately needed rests on a very personal knowledge of the students, their backgrounds, and their responses to the program. Our claim is further strengthened by the strong support of the parents, the Mexican-American community, and teachers and officials of the public schools.

Conclusion

We have described in some detail the Colorado Mexican-American Student Program. The purpose of this program is to motivate Mexican-American high school students to go to college. Because of the success

of this program, and the fact that it can easily be modified to fit in any department or group of departments, we would like to urge it upon other departments and colleges that are interested in becoming involved with minority group education.

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References

1. See, for example: C. S. Heller, Mexican-American Youth (Random House, New York, 1966); Carey McWilliams, North from Mexico (Greenwood Press, New York, 1968); P. D. Ortego, "Schools for Mexican-Americans: Between Two Cultures," Saturday Review 54, 62 (April 17, 1971).

2. B. G. Levi, Physicists Teach Minority Students," Physics Today 23, 53 (March 1970).